

Control Data® 9410

Finch™ Eight-Inch Fixed Disk Drive

MAY - 1981
CD CONTROL DATA 3/81

The Control Data Model 9410 Finch Disk Drive is an eight-inch rigid disk drive that provides 8 or 24 megabytes of unformatted storage on fixed, lubricated media in a sealed recording environment.

The Model 9410 mounts vertically or horizontally in the same space as an eight-inch flexible disk drive. The Finch digital interface is intended to be attached to a single controller capable of controlling both a 9410 and a flexible disk drive.

Features

- Full data recovery circuitry
- Sealed disk, head and actuator chamber
- No preventive maintenance required
- LSI circuitry
- Low noise for office use
- Vertical or horizontal mounting
- Less than 350 BTU power dissipation
- Rotary voice coil actuator
- User-defined sectoring

Functional Description

The 9410 has one (8 megabytes) or two (24 megabytes) disks located in an environmentally sealed chamber; no unfiltered outside air is drawn into the unit. Air is recirculated within the disk/actuator chamber and passes through a filter to ensure a contamination-free environment. A rotary voice coil actuator provides rapid access and positioning accuracy.



The use of large scale integrated (LSI) circuitry and microprocessor control means that only three circuit boards are used. Phase-locked oscillator data recovery and reference clocking increases data integrity.

The 9410 can be configured with up to four drives in a star or daisy-chain configuration. The interface also allows the 9410 to be placed in a daisy-chain configuration with flexible disk drives.

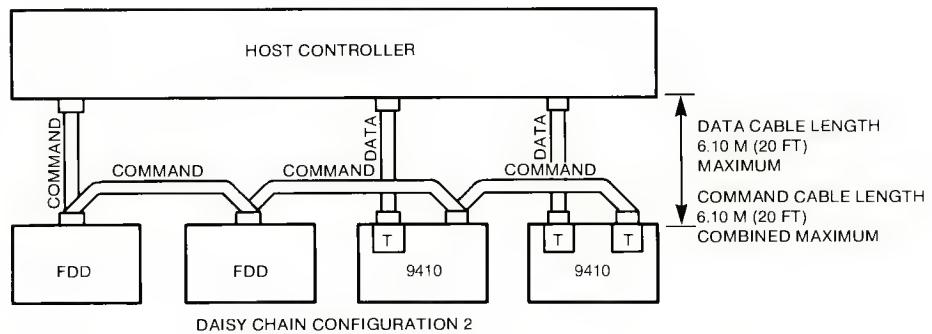
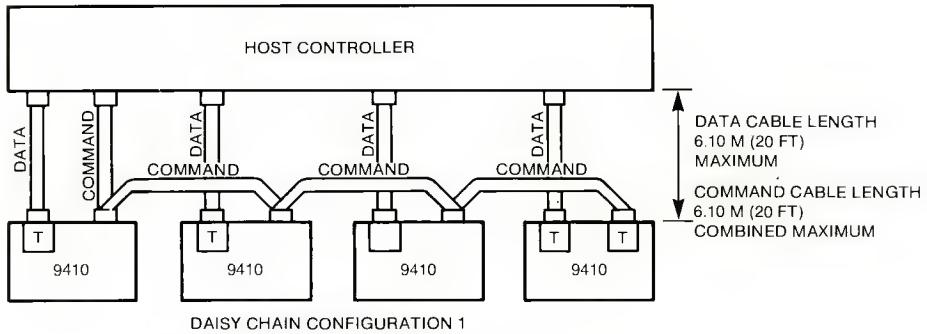
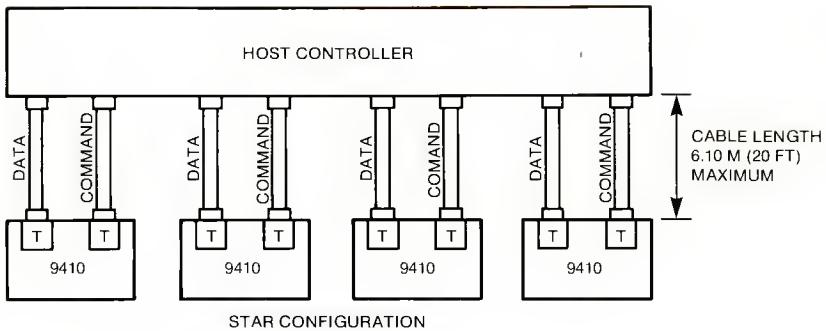
Applications

- Memory extension
- Word processing
- Small business systems
- Terminal systems
- Flexible disk drive system enhancement

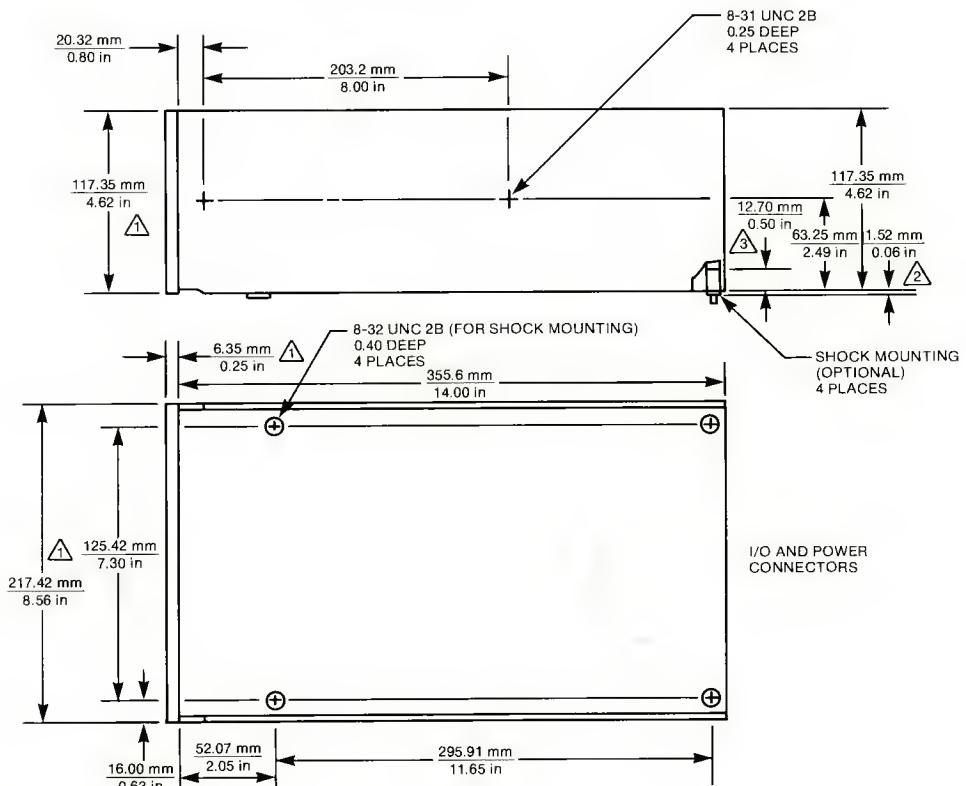
Options/Accessories

- Shock mounts
- I/O cables
- Power supply
- Power cable
- Hardware maintenance manuals
- Suitcase tester

Configuration Options



NOTE: T INDICATES TERMINATOR RESISTOR PACK.



OPTIONAL FRONT PANEL
NOMINAL MOUNTING, NO SHOCKS,
RIGHT SIDE ONLY



NOMINAL SHOCK MOUNTING
PROTRUSION

Command Cable Interface

DASH 1 INTERFACE

| SIGNAL DIRECTION | SIGNAL DIRECTION | SIGNAL GROUND PIN NO. | PIN NO. |
|--------------------------|------------------|-----------------------|---------|
| NA | | 2 | 1 |
| RETURN TO ZERO (RTZ) | | 4 | 3 |
| NA | | 6 | 5 |
| INDEX | | 8 | 7 |
| NA | | 10 | 9 |
| STEP | | 12 | 11 |
| DIRECTION | | 14 | 13 |
| WRITE ENABLE | | 16 | 15 |
| NA | | 18 | 17 |
| UNIT SELECT -1 | | 20 | 19 |
| UNIT SELECT -2 | | 22 | 21 |
| UNIT SELECT -3 | | 24 | 23 |
| UNIT SELECT -4 | | 26 | 25 |
| UNIT READY -1 | | 28 | 27 |
| UNIT READY -2 | | 30 | 29 |
| UNIT READY -3 | | 32 | 31 |
| UNIT READY -4 | | 34 | 33 |
| NA | | 36 | 35 |
| READ ENABLE | | 38 | 37 |
| HEAD SELECT 2° | | 40 | 39 |
| HEAD SELECT 2' | | 42 | 41 |
| RESERVED FOR FACTORY USE | | 43 | — |
| WRITE FAULT | | 44 | — |
| NA | | 45 | — |
| FAULT RESET | | 46 | — |
| NA | | 47 | — |
| BYTE CLOCK | | 48 | — |
| DISK TYPE | | 50 | 49 |

9410 COMMAND CONNECTOR*

Data Cable Interface

DASH 1 INTERFACE

| SIGNAL DIRECTION | SIGNAL DIRECTION | PIN NO. | TYPE* |
|--------------------------|------------------|---------|-------|
| INDEX | | 1 | SE |
| GROUND | | 2 | |
| BYTE CLOCK | | 3 | SE |
| GROUND | | 4 | |
| EARLY DATA STROBE ENABLE | | 5 | SE |
| LATE DATA STROBE ENABLE | | 6 | SE |
| UNIT SELECTED | | 7 | SE |
| GROUND | | 8 | |
| WRITE DATA "+" | | 9 | DIFF |
| WRITE DATA "-" | | 10 | DIFF |
| GROUND | | 11 | |
| WRITE CLOCK "+" | | 12 | DIFF |
| WRITE CLOCK "-" | | 13 | DIFF |
| GROUND | | 14 | |
| SERVO/READ CLOCK "+" | | 15 | DIFF |
| SERVO/READ CLOCK "-" | | 16 | DIFF |
| GROUND | | 17 | |
| READ DATA "+" | | 18 | DIFF |
| READ DATA "-" | | 19 | DIFF |
| GROUND | | 20 | |

9410 DATA CONNECTOR*

*SE = SINGLE-ENDED SIGNAL

DIFF = DIFFERENTIAL SIGNAL

Command Cable Interface

DASH 3 INTERFACE

| SIGNAL DIRECTION | SIGNAL DIRECTION | SIGNAL GROUND PIN NO. | PIN NO. |
|-------------------------|------------------|-----------------------|---------|
| RESERVED FOR FUTURE USE | | 2 | 1 |
| READ ENABLE | | 4 | 3 |
| FAULT RESET | | 6 | 5 |
| HEAD SELECT 2' | | 8 | 7 |
| TWO DISKS | | 10 | 9 |
| RESERVED FOR FUTURE USE | | 12 | 11 |
| HEAD SELECT 2° | | 14 | 13 |
| NA | | 16 | 15 |
| RETURN TO ZERO | | 18 | 17 |
| INDEX | | 20 | 19 |
| DRIVE READY | | 22 | 21 |
| BYTE CLOCK | | 24 | 23 |
| DRIVE SELECT 1 | | 26 | 25 |
| DRIVE SELECT 2 | | 28 | 27 |
| DRIVE SELECT 3 | | 30 | 29 |
| DRIVE SELECT 4 | | 32 | 31 |
| DIRECTION | | 34 | 33 |
| STEP | | 36 | 35 |
| NA | | 38 | 37 |
| WRITE ENABLE | | 40 | 39 |
| NA | | 42 | 41 |
| NA | | 44 | 43 |
| NA | | 46 | 45 |
| WRITE FAULT | | 48 | 47 |
| NA | | 50 | 49 |

9410 COMMAND CONNECTOR*

EDGE CONNECTOR

Data Cable Interface

DASH 3 INTERFACE

| SIGNAL DIRECTION | SIGNAL DIRECTION | PIN NO. | TYPE* |
|--------------------------|------------------|---------|-------|
| INDEX | | 1 | SE |
| GROUND | | 2 | |
| BYTE CLOCK | | 3 | SE |
| GROUND | | 4 | |
| EARLY DATA STROBE ENABLE | | 5 | SE |
| LATE DATA STROBE ENABLE | | 6 | SE |
| UNIT READY | | 7 | SE |
| GROUND | | 8 | |
| WRITE DATA "+" | | 9 | DIFF |
| WRITE DATA "-" | | 10 | DIFF |
| GROUND | | 11 | |
| WRITE CLOCK "+" | | 12 | DIFF |
| WRITE CLOCK "-" | | 13 | DIFF |
| GROUND | | 14 | |
| SERVO/READ CLOCK "+" | | 15 | DIFF |
| SERVO/READ CLOCK "-" | | 16 | DIFF |
| GROUND | | 17 | |
| READ DATA "+" | | 18 | DIFF |
| READ DATA "-" | | 19 | DIFF |
| GROUND | | 20 | |

9410 DATA CONNECTOR*

3M CONNECTOR

*SE = SINGLE-ENDED SIGNAL

DIFF = DIFFERENTIAL SIGNAL

*— ALL SIGNALS IN THE COMMAND CABLE ARE SINGLE-ENDED SIGNALS.

Specifications

Performance

| | |
|---------------|--------------|
| Transfer Rate | 6.45 Mbits/s |
| Spindle Speed | 3,600 r/min |

Access Time (at 50 kHz step pulse rate)

| | | |
|-----------------------|---------------|----------------|
| Maximum, Full Stroke | 100 ms | |
| Average | 50 ms | |
| Maximum, One Track | 10 ms | |
| | <u>9410-8</u> | <u>9410-24</u> |
| Number of Disks | 1 | 2 |
| Total Surfaces | 2 | 4 |
| Data Surfaces | 1 | 3 |
| Servo Surfaces | 1 | 1 |
| Capacity, Unformatted | 8 Mb | 24 Mb |
| Per Surface | 8 Mb | 8 Mb |
| Per Track | 13,440 bytes | 13,440 bytes |

Recording

| | | |
|--------------------|----------------------------------|----------------------------------|
| Track Density | 554 Tracks per/in | 554 Tracks per/in |
| Tracks Per Surface | 605 | 605 |
| Recording Method | NRZ at interface, MFM on disk | NRZ at interface, MFM on disk |
| Positioning Method | Rotary voice coil actuator | Rotary voice coil actuator |

Reliability

| | |
|------------------------|-------------------------|
| MTBF | 10,000 hours |
| Service Life | 5 years or 30,000 hours |
| Preventive Maintenance | None |
| Adjustments | None |

Data Reliability

| | |
|---------------------------|--|
| Recoverable Read Errors | Less than 1 in 10 ¹⁰ bits transferred |
| Unrecoverable Read Errors | Less than 1 in 10 ¹² bits transferred |
| Seek Errors | Less than 1 in 10 ⁶ seek operations |

Power Requirements

| | |
|-------------------|--|
| AC | None |
| DC | +5 V ($\pm 2\%$), 1.1A |
| | -5.2 V ($\pm 2\%$), 2.0A |
| | +24 V ($\pm 10\%$), 2.8A (4.5A peak) |
| Power Dissipation | Less than 102.55 W (350 BTU) |

Environmental

| | |
|---------------------------|------------------------------------|
| Operating Temperature | 10°C to 40°C (50°F to 104°F) |
| Non-Operating Temperature | -40°C to 60°C (-40°F to 158°F) |
| Operating Humidity | 20% to 80% RH |
| Non-Operating Humidity | 5% to 95% RH |
| Altitude, Sea Level Ref. | |
| Operating | -300 to +2000 m (-983 to +6560 ft) |
| Non-Operating | -300 to +3000 m (-983 to +9850 ft) |

Physical Characteristics

| | |
|--------|-------------------|
| Height | 106 mm (4.16 in) |
| Width | 218 mm (8.57 in) |
| Depth | 362 mm (14.25 in) |
| Weight | 9.53 kg (21 lb) |

Specifications subject to change without notice.

Control Data sales offices are located in principal cities throughout the world.

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